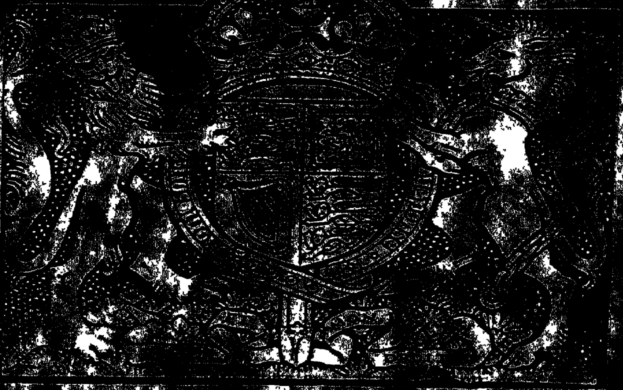

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RESEARCH INSTITUTE, NEW DELHI.

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY,

INCLUDING

ZOOLOGY, BOTANY, AND GEOLOGY.

(BEING A CONTINUATION OF THE 'ANNALS' COMBINED WITH LOUDON AND
CHARLESWORTH'S 'MAGAZINE OF NATURAL HISTORY.')

CONDUCTED BY

SIR A. SMITH WOODWARD, LL.D., F.R.S., F.G.S.,
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VOL. XX.—TENTH SERIES.

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"Omnes res creatæ sunt divinæ sapientiæ et potentiæ testes, divitiæ felicitatis humanæ:—ex harum usu *bonitas* Creatoris; ex pulchritudine *sapientia* Domini: ex œconomiâ in conservatione, proportione, renovatione, *potentia* majestatis elucet. Earum itaque indagatio ab hominibus sibi relictis semper æstimata; à verè eruditis et sapientibus semper exculta; malè doctis et barbaris semper inimica fuit."—LINNÆUS.

"Quel que soit le principe de la vie animale, il ne faut qu'ouvrir les yeux pour voir qu'elle est le chef-d'œuvre de la Toute-puissance, et le but auquel se rapportent toutes ses opérations."—BRUCKNER, *Théorie du Système Animal*, Leyden, 1767.

. . . . The sylvan powers
Obey our summons; from their deepest dells
The Dryads come, and throw their garlands
And odorous branches at our feet; the Nymphs
That press with nimble step the mountain-thyme
And purple heath-flower come not empty-handed,
But scatter round ten thousand forms minute
Of velvet moss or lichen, torn from rock
Or rifted oak or cavern deep: the Naiads too
Quit their loved native stream, from whose smooth face
They crop the lily, and each sedge and rush
That drinks the rippling tide: the frozen poles,
Where peril waits the bold adventurer's tread,
The burning sands of Borneo and Cayenne,
All, all to us unlock their secret stores
And pay their cheerful tribute.

J. TAYLOR, *Norwich*, 1818.

ALERE FLAMMAM.

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THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

[TENTH SERIES.]

> "…………………… per litora spargite museum,
> Naiades, et circum vitreos considite fontes:
> Pollice virgineo teneros hic carpite flores:
> Floribus et pictum, divæ, replete canistrum.
> At vos, o Nymphæ Craterides, ite sub undas
> Ite, recurvato variata corallia trunco
> Vellite muscosis e rupibus, et mihi conchas
> Ferte, Deæ pelagi, et pingui conchylia succo."
> *N. Parthenii Giannettasi*, Ecl. 1.

No. 115. JULY 1937.

I.—Ceratopogonidæ *from Trinidad.*

By J. W. S. Macfie.

This collection of biting midges was made by Mr. A. M. Adamson, from January 1934 to April 1936, on the island of Trinidad and neighbouring islands of the West Indies. Several of the insects were taken in the act of biting. They were preserved in spirit.

The collection consists of 182 specimens, most of them (118) *Culicoides*. They represent species of *Holoconops* (1), *Forcipomyia* (2), *Atrichopogon* (5), *Culicoides* (5), *Dasyhelea* (4), and *Monohelea* (1). Three species appear to be new, namely, two forms of *Atrichopogon* and one *Dasyhelea*, and the males of four other species are here described for the first time. Five species, which may also be new, are not described for lack of sufficient material. The others, the majority, appear to belong to species previously recognized in the West Indian Islands or on the mainland of South or Central America. The method of description and the terms used are those I have adopted in a number of recent papers. The unit referred to in measurements is 3·7 μ.

The types of new species are preserved in the collection of the British Museum (Natural History).

Holoconops hondurensis Hoff.

TRINIDAD : Granville Bay, 6. i. 1934, 10 ♀♀.

These specimens are probably the same as those from Honduras and Cuba described by Hoffman (1926) and named by him *L.* (*H.*) *hondurensis*. They are about the same size, length of wing 0·8–0·9 mm., and agree, apparently, in all other respects, excepting that the scutellum bears only a single pair of bristles. The terminal segment of the antenna is slightly longer than the combined lengths of the next three. It is slightly more than twice as long as broad. In *H. hondurensis* the length of this segment is described as "four times its width," but in the excellent figure it is shown as only slightly over twice the width. The two spermathecæ are elongate-oval, subequal, about 48 μ by 27 μ (average of 8); the duct is not chitinized.

Forcipomyia ingrami Carter.

TRINIDAD : St. Augustine, 4. xi. 1934, 8 ♂♂, 2 ♀♀, "sweeping over grass."

Forcipomyia sp.

TRINIDAD : St. Augustine, 4. x. 1935, 1 ♀.

This specimen resembles *F. inornatipennis* (Aust.) var. *ornaticrus* Ingram & Macfie, but in the absence of males cannot be more precisely identified.

Atrichopogon insigniventris Macfie.

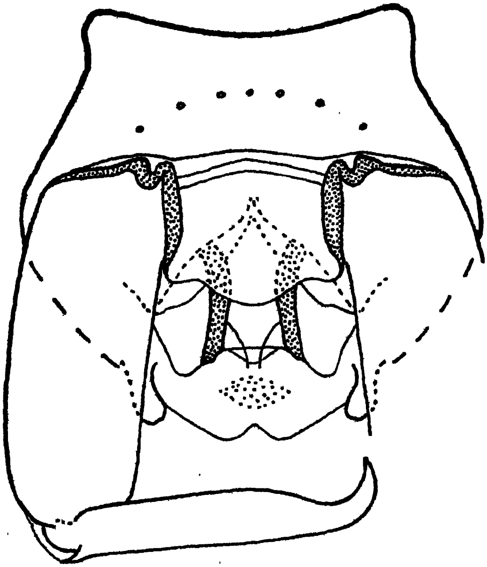
TRINIDAD : St. Augustine, 4. xi. 1934, 1 ♂, 16 ♀♀, "sweeping over grass," and 11. i. 1936, 1 ♀.

The females do not differ in any essential respect from those collected in Brazil. There are, however, fewer macrotrichia on the wings, only a few, or none, in cell *M* 1, and none in cell *M* 2. The spermatheca in some specimens is smaller, but otherwise similar. The characters of the male (not previously known) are as follows :—

♂.—Length of wing about 1·3 mm., greatest breadth about 0·35 mm.

Head very dark brown. Eyes hairy. Palpi dark brown: third segment slightly inflated in distal half, with small deep pit; lengths of last three segments about 18, 6, and 15 units respectively. Antennæ very dark: segments 4–11 ranging from about 14 by 11 to 15 by 7 units; 12–14 elongate, lengths about 21, 30, and 26 units respectively; 15 about 39 (including stylet, about 7 units) by 6–7 units.

Fig. 1.



Atrichopogon insigniventris Macfie.
Hypopygium of male, ventral view.

Thorax very dark brown, as in female. Scutellum not quite so dark: bearing four bristles, and a few (4) small hairs.

Wings unadorned. No macrotrichia. Costa extending about two-thirds length of wing. First radial cell practically obsolete, second narrow. Petiole of *M* about same length as cross-vein. Fork of *Cu* distal to that of *M*, at about same level as middle of first radial cell, its branches forming an acute angle. Halteres with pale coloured knobs.

Legs darkish brown, only first 1–2 tarsal segments paler brown. Form of segments and claws normal. *T.R.* about 3.

Abdomen dark brown. Hypopygium (fig. 1, p. 3) paler brown. Ninth sternite bearing a transverse row of seven bristles. Side-pieces long and narrow. Claspers with rather pronounced hooks. Ædeagus very complex, appearance as seen in ventral view shown in the figure.

Atrichopogon adamsoni, sp. n.

A rather small species with the head, scutum, and antennæ dark brown, the abdomen pale brown, and the scutellum and legs yellowish. *T.R.* only about 1.

♀.—Length of wing about 0·9 mm., greatest breadth about 0·37 mm.

Head very dark brown. Eyes hairy. Clypeus rather pale brown, unusually large. Palpi yellowish brown or very pale brown: third segment subcylindrical, with very small pit; lengths of last three segments about 12, 7, and 8 units respectively. Antennæ dark brown: segments 4–10 oval, ranging from 8 by 6–7 to 9 by 6 units; 11–14 elongate, successively a little longer, ranging from about 18 to 23 by 4–5 units; 15 about 31 (including stylet, about 7 units) by 4–5 units. The combined lengths of segments 11–15, 4–10, and 3–10 about 113, 63, and 74 units respectively.

Thorax with scutum very dark brown, shoulder areas, sides, and posterior margin yellowish. Scutellum yellow: bearing two lateral and two centro-marginal black bristles, but no (or one) small hairs. Post-scutellum yellowish brown.

Wings unadorned. Macrotrichia scanty, a few at periphery at tip, one or two between branches of *M* and at distal end of *M* 1. Costa extending about two-thirds length of wing. Both radial cells open. Petiole of *M* shorter than cross-vein. Fork of *Cu* at about level of base of second radial cell. Angle formed by branches of *Cu* much less than a right angle. Halteres with pale, yellowish, knobs.

Legs yellowish brown. Form of segments, claws, and empodium normal. Second tarsal segment unusually long. *T.R.* about 1.

Abdomen pale brown, unarmed. Spermatheca single, highly chitinized, subspherical, diameter about 50–60 μ; the duct part short, about 4 μ, but unusually wide, about 15 μ.

TRINIDAD: St. Augustine, 11. i. 1936, 3 ♀♀.

This species, which differs from all others with which it is likely to be confused in the Tarsal Ratio and the form of the spermatheca, I dedicate to Mr. A. M. Adamson, the collector of the specimens.

Atrichopogon trinidadensis, sp. n.

A species of moderate size with very dark brown thorax and paler brown legs and abdomen.

♂.—Length of wing about 1 mm., greatest breadth about 0·3 mm.

Head very dark brown. Eyes hairy. Palpi dark brown: third segment slightly inflated about middle, with pit; lengths of last three segments about 13, 7, and 9 units respectively. Antennæ with last three segments dark brown, other segments and plume pale brown: segments 4–11 successvely narrower, ranging from about 13 by 10 to 11 by 7 units; 12 subcylindrical, only slightly longer, about 12 by 5–6 units; 13–15 more elongate, about 25, 23, and 32 (including stylet, about 5 units) by 5–6 units respectively.

Thorax very dark brown. Scutal adornment as usual, but obscured by general dark colour, only small pale areas distinct on each side just before scutellum. Scutellum very dark brown, bearing two centro-marginal bristles and a few (6) small hairs.

Wings unadorned, without macrotrichia. Costa extending about two-thirds length of wing. First radial cell almost obliterated; second narrow, much longer. Petiole of *M* about as long as cross-vein. Fork of *Cu* much more distal than that of *M*, at about level of base of second radial cell. Angle formed by branches of *Cu* less than right angle. Halteres with rather dark brown knobs.

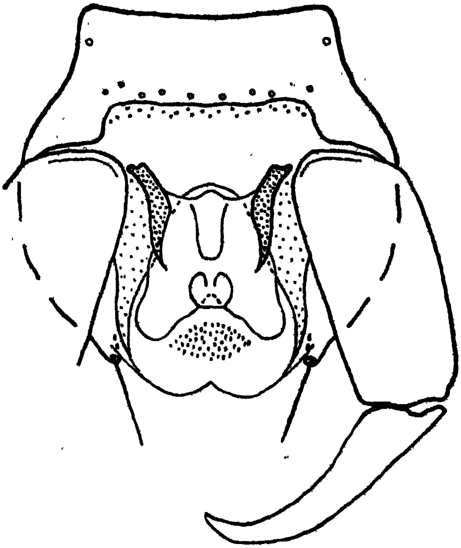
Legs almost uniformly brown. Form of segments, claws, and empodium normal. *T.R.* just under 3.

Abdomen darkish brown, with few hairs. Hypopygium (fig. 2) rather darker brown, in some respects resembling that of *A. insigniventris* Macfie. Ninth sternite widely excavated in middle line posteriorly, bearing a transverse row of nine bristles. Ninth tergite short, broader than long. Side-pieces and claspers about normal. Median structures complex, appearance in ventral view as shown in fig. 2.

Trinidad : St. Augustine, 11. i. 1936, 1 ♂.

This species differs from all others with which I am acquainted in the form of the hypopygium. It should be readily recognizable by this means, and for this reason has been described.

Fig. 2.



Atrichopogon trinidadensis, **sp. n.**
Hypopygium of male, ventral view.

Atrichopogon spp.

Trinidad : St. Augustine, 11. i. 1936, 2 ♀♀.

These two rather small, dark brown insects belong to different species, for the one has yellowish-brown legs and the wings devoid of macrotrichia, whereas the other has rather darker brown legs and a few macrotrichia near the tips of the wings. Neither has any very characteristic feature, and it would be inadvisable, I think, to attempt to describe them until further material is available. One, however, has an abnormal wing, the branches of median vein rejoining at a level a little before the end of the costa.

Culicoides amazonius Macfie.

TRINIDAD : Granville Bay, 6. i. 1934, 2 ♀♀ ; Balandra Bay, 1. iv. 1934, 5 ♀♀ ; Manzanilla, 15. xii. 1935, 1 ♀ ; Toco, 12. i. 1936, 1 ♀, and 2. ii. 1936, 4 ♀♀ ; Blanchisseuse, 9. ii. 1936, 10 ♀♀ ; and Tobago, 12. iv. 1936, 1 ♀.

Culicoides debilipalpis Lutz.

TRINIDAD : Macqueripe Bay, 6. x. 1936, 2 ♀♀.

These insects agree well with the description and excellent figure of the wing of *C. debilipalpis* given by Lutz. The following details may be added to those given by Lutz to facilitate comparison with other species.

♀.—Length of wing 0·9 mm., greatest breadth 0·39 mm. Palpi brown : third segment inflated, with large pit ; lengths of last three segments about 13, 7, and 7 units respectively. Antennæ pale brown : segments 4–10 slightly constricted at apex, ranging from about 8 by 6 to 10 by 4 units ; 11–14 continue the series, subequal, about 11–12 by 4–5 units ; 15 about 17 by 5 units, without stylet. The combined lengths of segments 11–15, 4–10, and 3–10 about 63, 63, and 73 units respectively. Thorax very dark brown with a rather indistinct scutal adornment (spirit-specimens) composed of bands and blotches, without small spots. Scutellum quite as dark as scutum, bearing two lateral and two centro-marginal bristles and a few (7) small hairs. Wings with rather more numerous macrotrichia than usual, a double line extending almost to base between *M* and *Cu*. Legs banded, with all knees dark. On fore and middle legs with a narrow pale band on each side of knees. Hind legs with femora all dark brown, tibiæ with narrow pale band at both base and apex. *T.R.* 2. Spermathecæ two, highly chitinized, pyriform, rather unequal, total length 45–55 μ, and greatest breadth 30–35 μ.

Culicoides diabolicus Hoff.

TRINIDAD : near mouth of Nariva River, 17. iii. 1935, 2 ♀♀ ; Montserrat Distr., 12. xii. 1935, 1 ♂ ; and St. Augustine, 11. i. 1936, 11 ♂♂, 35 ♀♀.

These insects, which I refer to *Culicoides diabolicus* Hoff., appear to be the same as the two females from Colombia examined by me and assigned to this species (1932). The considerable series of specimens from St. Augustine, including both males and females, show to some extent the range of variation met with in the species. The specimens differ considerably in size, the length of the wing in the females ranging from about 1·0 to 1·3 mm. There is, of course, a corresponding variation in the sizes of the spermathecæ, and of the segments of the palps and antennæ. Some of the specimens are very dark brown, others much paler; and the thoracic adornment and the yellowish markings on the knees and hind tibiæ are sometimes distinct, sometimes almost obscured. The variation in the adornment of the wings is notable. The pale areas are more extensive in some specimens than in others, and the pale lines bordering the veins show a considerable degree of variation. The following points should be especially mentioned. The whole length of the cross-vein may be pale, but more usually the anterior end of it is dark brown, forming a dark spot of varying size and intensity in the middle of the pale area which envelops the cross-vein. The vein R 4+5 may have the distal half pale or may be dark brown for the greater part of its length. Sometimes the whole of that part of it which forms the posterior margin of the second radial cell is dark. There may also be an infuscated spot just below the point where R 4+5 turns up to join the costa. The two females from Tutoia, Brazil, described by me (1935) as *Culicoides* (?) *diabolicus* Hoff. and *Culicoides* sp. respectively, are therefore clearly both varieties of this species. The distal pale spot between the rami of *M* (that is, the one situated close to the margin of the wing) may be distinct, indistinct, or quite indistinguishable. In males especially it is often ill defined, but, so far as I can see, there are no differences either in the hypopygium or elsewhere between those with and those without this pale spot. Specimens in which it is wanting would seem to resemble very closely the Brazilian species *C. guttatus* (and *C. insignis* Lutz), and the conclusion appears inescapable that *C. diabolicus* Hoffman, 1925, is a variety of *C. guttatus* Coquillet, 1904.

The pale spot between the rami of *Cu* may be free (that is, completely surrounded by a darker zone) or may be more or less fused with the pale line on the inner side of *Cu* 1. Bearing in mind these variations, and the locality, it seems probable that the single female from Trinidad described by Hoffman, and named by him *Culicoides trinidadensis*, is not a distinct species.

The chief characters of the male, which has not previously been described, are as follows :—

♂.—Length of wing about 1·1 mm., greatest breadth about 0·35 mm.

Head dark brown. Palpi darkish brown : third segment slightly inflated near middle, with small pit in distal third ; lengths of last three segments about 13, 8, and 10 units respectively. Antennæ rather pale brown : segments 4–11 in one specimen ranging from 11 by 8 to 11 by 5 units ; 12 only slightly longer, about 12 by 5 units ; 13–15 longer, about 27, 27, and 31 units respectively, the last without stylet.

Thorax dark brown. Scutum with indistinct pattern composed of large patches (spirit-specimens). Scutellum about as dark as scutum : bearing two lateral and two centro-marginal bristles, but no small hairs.

Wings with adornment and venation as in female. Macrotrichia amost completely absent, at most a very few at tip. Halteres with brown knobs.

Legs darkish brown, with yellowish knee-spots ; tibiæ of hind legs with conspicuous yellowish band at base and apex. Fourth tarsal segments not cordiform. *T.R.* about 2.

Abdomen darkish brown. Hypopygium closely resembling that of *C. austeni* C. I. & M. Ninth tergite rectangular, almost as broad posteriorly as at base, with small notch in middle of posterior margin. In addition to a rather large pair of hairy processes, there are on the posterior margin a pair of finger-like processes. These are directed inwards, towards the middle line, and may be hidden. They may have been overlooked in *C. austeni*, a point I have not had an opportunity of confirming. Ninth sternite moderately excavated in middle line posteriorly : the membrane joining it to ædeagus not spiculate. Claspers, harpes, and ædeagus as in *C. austeni.*

Culicoides furens (Poey).

This species, which appears to be widely distributed in the West Indies and on neighbouring portions of the mainland, is briefly redescribed here because most of the published descriptions lay stress on details of coloration, which, of course, are not appreciable in specimens preserved in fluids.

♂♀.—Length of wing about 1·0–1·1 mm., greatest breadth about 0·4–0·5 mm.

Head dark brown. Eyes bare, narrowly separated above in both sexes. Palpi darkish brown: third segment inflated distally, with large pit; lengths of last three segments about 19, 9, and 9 units in one female, and 13, 8, and 9 units in one male. Antennæ pale brown, terminal segments a little darker than others; without stylet. In male, plume rather small, brown: segment 3 with very long stalk; 4–11 ranging from about 9 by 7 to 7 by 7 units; 12 only slightly longer, about 8 by 7 units; 13–15 elongate, their lengths about 27, 24, and 30 units respectively. In female, segments 4–10 subequal, about 8 by 6–7 units; 11–14 elongate, ranging from 15 to 19 by 5 units; 15 about 26 by 5 units. The combined lengths of segments 11–15, 4–10, and 3–10 about 96, 60, and 70 units respectively.

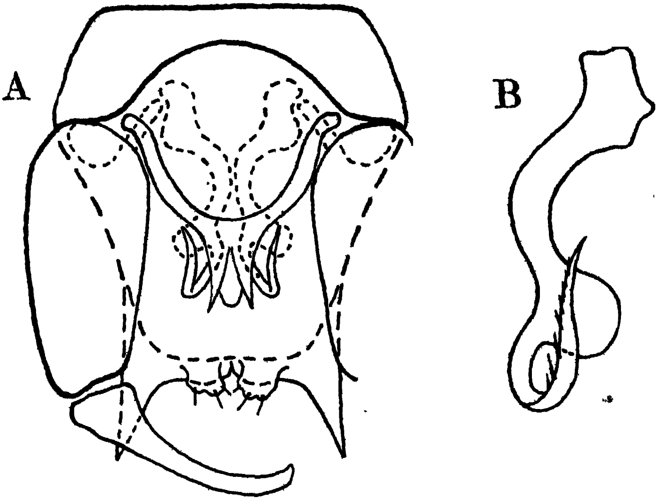
Thorax darkish brown, the scutum adorned with dark brown spots and blotches arranged as shown in the excellent figure of *C. dovei* given by Dove, Hall, and Hull (1932). Scutellum yellowish brown, but darker brown in middle; bearing two lateral and one or two centro-marginal bristles and a few (about 6–8 in female) small hairs.

Wings adorned with pale spots as shown in the figures of Lutz (1913), Hoffman (1925), and others. Pale areas slightly variable in different individuals, the three spots at the end of the costa, for example, tending to coalesce in some specimens. Pale areas similarly arranged in both sexes, but more extensive in males. Macrotrichia rather variable in number, but in females covering distal third of wing, and spreading along posterior border. In males they are more scanty, restricted almost completely to tip anterior to *M* 1. Venation normal. Halteres with pale coloured knobs.

Legs banded, and with dark brown knee-spots. Femora and tibiæ of hind legs with pale bands just before both base and apex. The pale band at apex of tibia on fore and middle legs much less distinct or absent. Fourth tarsal segments short, but not cordiform. Claws normal. *T.R.* about 2 in male, 2·3 in female.

Abdomen darkish brown. Spermathecæ 2, only moderately chitinized, oval or subspherical, about 45 μ by 41 μ; the commencement of the duct chitinized rather feebly for some distance, about 18 μ. Hypopygium (fig. 3) darkish brown, in ventral view appearing as shown in the figure. Ninth tergite with posterior margin notched, and bearing at each angle a long process. Ninth sternite without bristles, deeply excavated in middle line posteriorly. Claspers narrowing rather abruptly a little beyond base, rather feebly chitinized at ends. Harpes somewhat resembling those of *C. accraensis* C. I. & M., their fimbriated ends bent ventrally over the ædeagus. Ædeagus with chitinzed portion forming a rounded

Fig. 3.



Culicoides furens (Poey).
A, hypopygium of male, ventral view;
B, harpe at greater magnification.

arch. Membrane joining ædeagus to ninth sternite not spiculate.

TRINIDAD: Patos Island, 10. xi. 1934, 2 ♀♀; Mayaro, 6. i. 1935, 11 ♀♀; St. Joseph, Mayaro, 17. iii. 1935, 5 ♀♀; and St. Augustine, 18. iv. 1935, 4 ♂♂, 2 ♀♀, and 11. i. 1936, 2 ♂♂, 2 ♀♀.

Culicoides maculithorax (Williston, 1896) and *C. dovei* Hall, 1932, are apparently synonyms of *C. furens* (Poey, 1853).

Culicoides stellifer Coq.

TRINIDAD: St. Augustine, 5. ii. 1935, 1 ♀, "Biting at 6 p.m.," 18. iv. 1935, 3 ♀♀, and 24. iv. 1935, 4 ♀♀; and Tunapuna, 1. v. 1935, 8 ♀♀.

♀.—Palpi with third segment inflated, with large pit; lengths of last three segments about 21, 7, and 10 units respectively. Antennæ with segments 4–10 oval, subequal, about 10 by 7 units; 11–14 subequal, about 16 by 5–6 units; 15 about 22 by 5 units. The combined lengths of segments 11–15, 4–10, and 3–10 about 85, 72, and 86 units respectively in the specimen measured. Scutum adorned with dark and pale brown patches, the arrangement similar to, but not identical with, that shown in Hoffman's (1925) figure. Legs banded, with dark brown knee-spots: hind legs with femora mainly yellowish, a narrow pale ring just before knee and a broader zone at base, the dark band between incomplete, tibiæ with yellowish basal and apical bands, and first tarsal segment infuscated. *T.R.* a little over 2. Fourth tarsal segments almost cordiform. Spermathecæ 2 (sometimes 3), highly chitinized, pyriform, about 48 μ by 37 μ; the duct chitinized for a short distance, about 5–7 μ.

Dasyhelea thalestris Macfie.

A rather large, darkish brown species, with yellowish-brown shoulder-areas, the scutellum mainly yellowish brown, but somewhat darker at the sides and in the middle, and the legs yellowish brown with darker brown knees and an infuscated patch on the hind femora.

♂♀.—Length of wing, about 1·1–1·3 mm., greatest breadth about 0·3–0·4 mm.; longer and narrower in male than in female.

Head dark brown. Eyes apparently bare or nearly so. Palpi pale brown, the last segment darker than the others: third segment subcylindrical, without pit; lengths of last three segments in both sexes about 15, 10, and 13 units respectively. Antennæ rather dark brown especially at tip; segments rather indistinctly sculptured, especially in female. In male, segments 4–11 ranging from about 15 by 15 to 12 by 10 units; 12–14 binodose, lengths in one specimen 33, 31, and 27 units respectively; 15 about 31 (including stylet, about 5 units) by 6 units. In female a slight change of shape between segments 4 and 5; segment 3 with short stalk; 4 subspherical, about 13 by 13 units; 5–10 tapering distally, successively longer and narrower, from about 12 by 10 to 15 by 8 units; 11–14 rather longer, subequal, about 18–19 by 6–7 units; 15 about 25 (including stylet, about 5 units) by 6 units. The combined lengths of segments 3–10, 4–10, and 11–15 about 108, 95, and 99 units respectively.

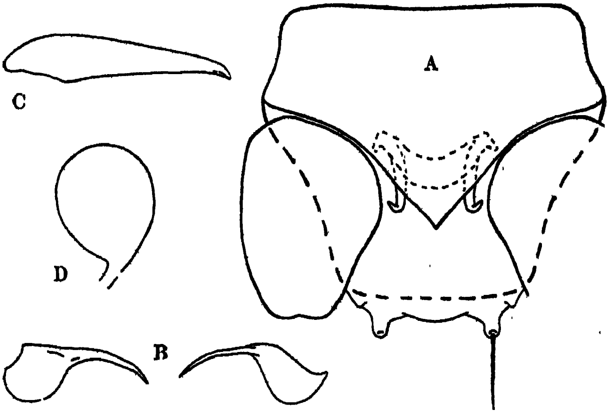
Thorax very dark brown with paler, yellowish brown, shoulders and sides. Scutellum yellowish brown, but darker at sides and in middle: bearing 2 lateral and six centro-marginal bristles and (in female only) a few (6) small hairs.

Wings unadorned, but radial veins somewhat infuscated as usual. Macrotrichia fairly numerous, extending towards base between *M* and *Cu* beyond level of cross-vein, but leaving rather narrow bare areas along veins. Costa reaching slightly beyond middle of wing in both sexes. First radial cell obliterated; second longer than broad in both sexes. Petiole of *M* about same length as cross-vein in female, somewhat shorter in male. Fork of *Cu* at about same level as middle (male) or base (female) of second radial cell. Halteres with pale coloured knobs.

Legs yellowish brown, the joints (especially knees) and terminal tarsal segments darker brown. Hind femora with a rather indistinct darkish brown patch near middle. Form of segments and claws normal. *T.R.* in male about 2, in female about 2·4.

Abdomen dark brown above and below, pale brown at sides. Spermatheca (fig. 4 D) single, moderately chitinized, oval or subspherical, about 48 μ by 44 μ; the commencement of duct oblique, feebly chitinized for some distance, about 10 μ. Hypopygium dark brown, appearance as seen in ventral view shown in figure (fig. 4 A–C). Ninth sternite without bristles, prolonged posteriorly in the middle line as a conical process the tip of which is highly chitinized. Ninth tergite bearing at each posterior angle a short finger-like process armed with a long strong bristle. Side-pieces short and broad; claspers unbranched, normal. Harpes poorly developed and feebly chitinized, a pair of horizontal rods projecting towards the middle line, expanded at their outer, attenuated at their inner extremities. I can see no trace of any rod between them projecting posteriorly. Ædeagus of common form, with a pair of strongly chitinized, hook-like processes projecting ventrally.

Fig. 4.



Dasyhelea thalestris Macfie. Hypopygium of male, ventral view. A, ninth segment and ædeagus; B, harpes; C, clasper; D, spermatheca of female.

Trinidad: St. Augustine, 4. xi. 1934, 2 ♂♂, 4 ♀♀, "Sweeping over grass"; and 18. iv. 1935, 6 ♂♂, 4 ♀♀.

These insects may be the same as the single female from Brazil described by me (1935) and named *Dasyhelea* *thalestris*. The small differences noted in the description given above may not be of specific importance in view of the close correspondence in other respects. The male was not previously known. This determination requires confirmation by the examination of males from Brazil.

Dasyhelea scissuræ, sp. n.

A small blackish species, with the scutellum very dark at the sides but paler in the middle, halteres with white knobs, and claspers bifid at the end.

♂.—Length of wing about 0·9 mm., greatest breadth about 0·3 mm.

Head blackish. Eyes densely hairy. Palpi dark brown: third segment hardly inflated, without pit; lengths of last three segments about 16, 8, and 10 units respectively. Antennæ very dark brown, with large blackish plumes. Segments sculptured. Segments 4–11 gradually narrowing, from about 9 by 9 to 10 by 7 units; 12–14 binodose, subequal, lengths about 20–22 units; 15 about 15 by 5 units, without stylet.

Thorax blackish. Scutellum also very dark, but slightly paler in middle: bearing two lateral and four centro-marginal bristles, but no small hairs.

Wings unadorned, but radial veins somewhat infuscated as usual. Macrotrichia rather scanty, leaving distinct bare areas along veins, and extending towards the base between *M* and *Cu* only about to level of cross-vein. Costa extending about half length of wing. First radial cell obliterated, second small, square. Stem of *M* shorter than cross-vein. Fork of *Cu* distal to level of end of costa. Halteres with brown stems and pale knobs.

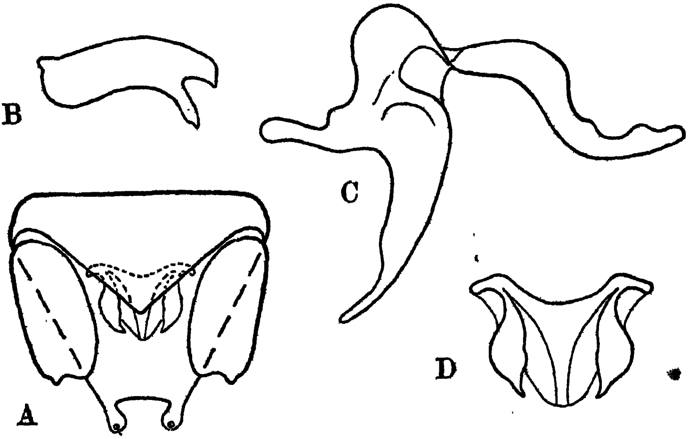
Legs dark brown, but tarsal segments 1–3 paler than rest. Form of segments normal. Claws small, equal, normal. *T.R.* about 2·2.

Abdomen dark brown. Hypopygium very dark, the appearance in ventral view as shown in the figures (fig. 5). Ninth sternite without bristles, prolonged posteriorly as a conical process. Ninth tergite bearing posteriorly a pair of knob-like processes. Claspers with bifid ends. Harpes large and irregular, with a long process projecting posteriorly. Chitinized portions of ædeagus as shown in the figure.

Trinidad : St. Augustine, 4. xi. 1934, 1 ♂, " Sweeping over grass."

This insect must be distinguished from the European species *Dasyhelea* (*Prokempia*) *bilobata* Kieff., in which also the claspers are bifid, but which has, apparently, a very long process at each posterior angle of the ninth tergite. It differs, too, in the proportions of the terminal segments of the antennæ and in the venation of the wings.

Fig. 5.



Dasyhelea scissuræ, sp. n. Hypopygium of male, ventral view. A, ninth segment and ædeagus ; B, clasper ; C, harpes ; D, ædeagus. [A at lower magnification than other three.]

Dasyhelea spp.

Trinidad : St. Augustine, 18. iv. 1935, 2 ♀♀.

These two small insects agree in having no stylet on the antennæ, bare areas present along veins of wings, and fork of *Cu* at (or slightly proximal to) level of end of costa, but differ in other respects. The one is very dark brown, with the antennæ dark brown and composed of an almost continuous series of segments, which are slightly narrowed at their apices, the femora and tibiæ uniformly dark brown, and the single spermatheca small and oval. The other is not so dark, and has the antennal segments less constricted apically, the femora and tibiæ yellowish brown, and the single spermatheca large, spherical, and with a narrow oblique duct portion. As they do not possess any very striking characteristics, it would be advisable, I think, to delay description until further specimens (especially males) are available.

Monohelea hieroglyphica Kieff.

A pale brown species, perhaps greenish or yellowish when alive, with wings adorned with blackish markings, and legs with dark brown spots and bands.

♀.—Length of wing about 1·2 mm., greatest breadth about 0·4 mm.

Head brown. Eyes bare, separated above by a wedge-shaped area. Palpi pale brown, short: third segment with small pit; lengths of last three segments about 10, 6, and 14 units respectively. Proboscis very short. Antennæ brown: segments 4–10 somewhat contracted towards apex, ranging from about 10 by 5 to 13 by 4 units; 11–14 rather longer, ranging from 17 to 20 by 4 units; 15 about 23 by 4 units, without stylet. Combined lengths of segments 11–15, 4–10, and 3–10 about 97, 81, and 96 units respectively.

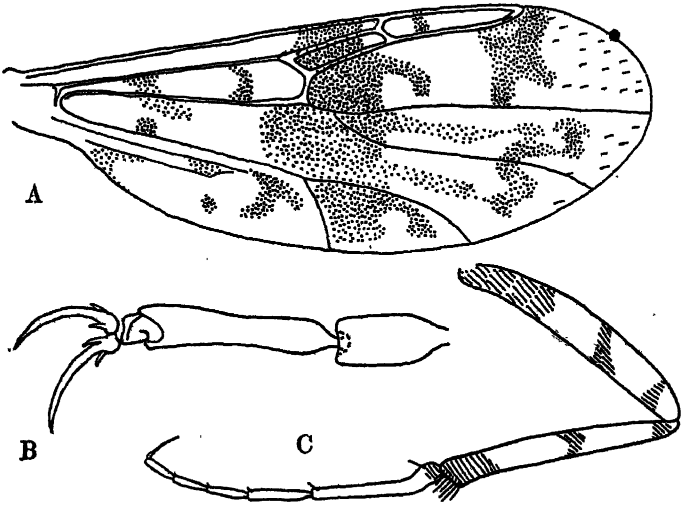
Thorax pale brown, with darker brown bands and spots. Bristles few, and no spine or tubercle. Scutellum pale brown, darker in middle; bearing two lateral and two centro-marginal bristles, and a few small hairs.

Wings (fig. 6 A) adorned with blackish markings arranged in a similar manner, but differing in detail, to those found in allied species. Veins pale, yellowish. Macrotrichia present at tip. Costa extending about three-quarters length of wing. Both radial cells well developed: first rectangular, about eight times as long as broad; second about once and a half length of first (internal measurements). Petiole of *M* about as long as cross-vein. Fork of *Cu* at about same level as cross-vein. Halteres almost colourless, the knobs adorned with blackish spots.

Legs pale brown, yellowish; all femora and tibiæ adorned with dark brown markings. Adornment of hind legs as shown in figure (fig. 6 C). First tarsal segment of hind legs curved at base, and armed with a stout basal spine. *T.R.* slightly over 2. Fourth tarsal segments cylindrical, those of hind legs about as long as fifth; fifth unarmed. Claws on four anterior legs two, equal, each with two minute barbs at base (fig. 6 B); those of hind legs single, without barbs, about as long as last segment.

Abdomen pale brown, almost colourless. Spermathecæ two, well chitinized, dissimilar; the one large, pyriform, total length about 90 μ, and greatest breadth about 63 μ, the other smaller, subspherical, diameter about 37 μ.

Fig. 6.



Monohelea hieroglyphica Kieff.

A, wing to show adornment; B, end of middle leg to show claws; C, hind leg.

TRINIDAD: St. Augustine, 11. i. 1936, 1 ♀.

This insect does not appear to differ in any essential respect from the Paraguayan species *Monohelea hieroglyphica* Kieffer, 1917. The above description is given to facilitate comparison with the other closely related species which are now known.

II.—*The Piaget Collection of Mallophaga.*—Part I.

By Gordon B. Thompson.

[Plate I.]

Biographical Note.

Edouard Piaget was born on November 3rd, 1817, at Les Bayards in the Canton of Neuchâtel, Switzerland. At the age of eighteen he took up an appointment as a teacher of French at Mr. de Raedt's College at Noorthey, Holland. During this time he attended Leiden University and took a doctorate degree in Roman Law in 1837. As a result of his mother's death he decided not to return to Switzerland to practice in the law as he had intended. He remained in the Netherlands as tutor to some well-known families until he was appointed Professor of French and History at the Erasmian Gymnasium in Rotterdam in 1844. Some years later he took an appointment at the Higher Citizen's school in Rotterdam and remained there until 1884 when he returned to Les Bayards to live with his sister. He continued his studies until the failing of his eyesight prevented him from reading. On September 10th, 1910, he died in the Hospital at Couvet, being then almost blind and totally deaf.

Piaget was a man of very wide scientific attainment. His particular interests, apart from History and Languages, were in Botany and Entomology. He used to take his pupils out into the country to collect plants and all orders of insects, excepting Lepidoptera.

His principal interest, from the very beginning of his collecting days, was in the "Pédiculines," and his idea was not only to form a large collection but to add to the knowledge of them. He once said that he had found an aim in life in the study of the "Pédiculines," concerning which at that time information was very limited. That he gained his objective is evidenced by the publication in 1880 of his 'Essai monographique, Les Pédiculines,' which was followed in 1885 by the "Supplément." The originals of the drawings that accompanied these works are now in the Zoological Library of the British Museum. They were all very beautifully executed and added much to the value of the published work. In the preface to the " Supplément " he mentioned that his failing eyesight would prevent him from doing any more work with the microscope, and in fact he published only four papers after the " Supplément " appeared. However, his writings remain the only complete and exhaustive account of the lice so far published, and in his knowledge of this group of insects the American entomologist Kellogg is perhaps his only serious rival.

That Piaget had other interests besides entomology is best remembered by the fact that he published a history, in two volumes, of the Order of Jesuits of the period 1540–1640.

HISTORY OF THE COLLECTION.

It appears that he commenced building up his collection after he went to the Netherlands. As soon as it became known that he was interested in the " Pédiculines " he received specimens from many parts of the world. Since a very great part of his collection of these insects was obtained from animals in the Zoological Gardens at Rotterdam and from skins in the Leiden Museum, it is understandable that there still remains in the Museum at Leiden a small number of slides which formed part of his original collection. The remainder of his entomological collection, together with his herbarium containing representatives of about 4000 species, and his extensive library, were given to the town of Neuchâtel, by him, in 1905. In 1928 the collection of " Pédiculines " was acquired by the British Museum through Dr. O. Fuhrmann, who has subsequently stated (in a letter to me) that it was sent over to England just as it was when presented to the Musée d'Histoire Naturelle at Neuchâtel. The great value of this collection lies in the fact that it contains the great majority of the specimens upon which Piaget based his Monograph, as well as its supplement and his numerous short papers. A complete list of his writings dealing with the biting lice will be found below.

In the following paper only the Mallophaga or biting lice are listed. This part of the collection, however, contains nearly 1850 slides of 3600 specimens representing 678 species.

METHOD OF PRESENT STUDY.

In drawing up this list Piaget's nomenclature has been strictly adhered to throughout, but Harrison's arrangement of the genera ('Parasitology,' 1916) has been followed. No references to the original descriptions of the species are given, as they may be easily ascertained by reference to Harrison's 'Genera and Species of the Mallophaga' (1916) or to Piaget's Monograph. In some cases Piaget spelt the name of the same host in more than one way, and no correction has been made. Neither has any attempt been made to synonymize the names of the hosts. So that all names are given here exactly as Piaget wrote them. In those cases in which a male or female of a species is mentioned in the original description, and the specimen is missing from the collection, a note to that effect has been made. A list is appended of the species described by Piaget, of which there are no specimens in the collection at the British Museum of Natural History.

DESCRIPTION OF PIAGET'S MOUNTED MATERIAL.

A Piaget slide consists of a piece of fairly clear glass about 6 × 2·5 cm. and 1 mm. in thickness. The specimens, usually more than one on each slide, are mounted in a liquid medium in the centre of the slide, but not in any definite arrangement. They are covered by a square cover-slip, roughly ·5 mm. in thickness, and between it and the slide is interposed a piece of fairly stout paper of the same size as the cover-slip, with a circle cut in it, thus forming a cell. All the cover-slips are heavily edged with Brunswick Black. Each slide bears two labels—on the one the name of the species with sexes and on the other the name of the host (see Pl. I. fig. 1).

Piaget writes in the introduction to 'Les Pédiculines' that he used a mixture of one part of glycerine and two parts of water. Chemical tests on the medium as it now is show that the proportion of glycerine is considerably modified. Considering that the collection is from fifty to fifty-six years old the glycerine medium has proved tolerably satisfactory.

Owing to the hygroscopic property of glycerine, much moisture has been absorbed from the atmosphere and specimens, and, as a result, the medium has become considerably diluted and the specimens partly macerated. In some of the mounts the thick edging of Brunswick Black has cracked and the medium has completely disappeared by evaporation, but the specimens are still intact within the mounts, though in a dry condition. In some of the larger mounts some substance has diffused into the liquid medium from the Brunswick Black and the specimens appear to have been stained deep red.

The specimens themselves are, generally speaking, in good condition, but very dirty. The soft internal organs of the insects seem in every case to have disappeared, and all that remains within the body-wall is a confused mass, consisting very probably of macerated parts mixed with the medium which has penetrated into the insect. This decaying of the internal organs may have been partly due to the fact that Piaget did not treat his specimens in any way before mounting them; and, judging from the external aspect of the insects, this is most probably true. A few specimens from the collection have been remounted in Canada balsam. They have yielded to treatment with 10 per cent. caustic potash for clearing purposes, followed by dehydration and staining, and have given good results, as shown in the photograph reproduced as Pl. I. fig. 2.

Owing to the condition of the specimens, the problem of ascertaining the number of males and females on each of the slides has by no means proved easy, and therefore the numbers given in this paper may be taken as provisional until such time as the collection is worked on. There is no doubt that during the remounting many more specimens will be found which have worked their way under the piece of stout paper which forms the cell.

Piaget did not fix any one or more of his specimens as the types of his species. It is hoped that during the necessarily slow process of remounting the collection opportunities will occur for establishing precisely the specimens which formed the basis of Piaget's descriptions and for the publication of revisional notes. The publication of the present list is a step in this direction.

List of the Piaget Material in the British Museum.

Species.	No. of specimens in B.M.	No. of slides.	Hosts.
Boopia grandis Piaget	7 ♀♀, 1 ♂, 1 imm.		*Macropus rufus.*
B. tarsata Piaget	1 ♀, 1 ♂, eggs.		*Phascolomys fossor.*
Gyropus gracilis Nitzsch in Burmeister.	♀♀, ♂♂, (c. 20).	6	*Cavia cobaya.*
G. ovalis Nitzsch in Burmeister	♀♀, ♂♂, (c. 15).		*Cavia cobaya.*
G. turbinatus Piaget	2 ♀♀.		*Arctomys marmotta.* "Sur une marmotte."
Menopon abdominale Piaget	2 ♀♀.		*Perdix coturnix.*
M. abnorme Piaget	1 ♀.		*Gallophasis hamatus.*
M. acuticeps Piaget	1 ♀.		*Sittace ararauna.*
M. acutovulvatum Piaget	7 ♀♀, 1 ♂,		*Buceros* sp.? (Amboina). *Buceros atratus.* *Buceros malabaricus.*
M. affine Piaget	2 ♀♀.		*Diomedea exulans.*
M. albescens Piaget*	3 ♂♂.		*Sula australis.*
M. albicans Piaget	4 ♀♀, 4 ♂♂,		*Euplocamus pyronotus.* *Euplocamus horsfieldi.*
M. albiceps Piaget	3 ♀♀, 2 ♂♂.		*Garrulus caledonicus* (Celebes).
M. albofasciatum Piaget	2 ♀♀, 1 ♂.	1	*Tadorna vulpanser.*
M. anathorax Nitzsch in Giebel	1 ♀, 1 ♂.	1	*Corvus monedula.*
M. appendiculatum Piaget	1 ♀, 1 ♂.	2	*Perdix cinerea.* *Psittacus erithacus.*
M. arctifasciatum Piaget	4 ♀♀, 2 ♂♂.	3	*Rhynchotus rufinus.*
M. atrofulvum Piaget	2 ♀♀, 2 ♂♂.	2	*Platalea leucorodia.*
M. bifurcatum Piaget	1 ♀.	1	*Psittacus erithacus.*
M. biseriatum Piaget	17 ♀♀, 11 ♂♂.	13	*Palamedes chavaria.* *Phasianus colchicus.* *Pavo specifer.* *Gallophasis cuvieri.* *Gallus domesticus.*
M. brevicolle Piaget	1 ♂*.	1	*Thinocorus rumicivorus.*
M. brevifimbriatum Piaget	2 ♂♂, 3 ♀♀.	2	*Procellaria glacialis.*
M. brevipalpe Piaget	2 ♀♀, 2 ♂♂.	2	*Phalacrocorax carbo.*
M. brevipes Piaget	2 ♀♀, 2 ♂♂.	2	*Crossoptilon mantschuricum.*
M. brevithoracicum Piaget	3 ♀♀, 2 ♂♂.	3	*Cygnus nigricollis.*
M. breviventre Piaget	1 ♂.	1	*Pastor tricolor* (Java).
M. brunneum Nitzsch	4 ♀♀, 2 ♂♂.	3	*Nucifraga caryocatactes.*
M. cinereum Piaget	2 ♀♀.	1	*Himantopus hæmatopus.*
M. cingulatum Piaget	1 ♀, 1 ♂.	1	*Polyborus vulgaris.*
M. circinctum Piaget	2 ♀♀.	1	*Stercorarus vomarius.*
M. concretum Piaget	2 ♀♀, 1 ♂.	2	*Porphyrio melanopterus.*
M. consanguineum Piaget	3 ♀♀, 1 ♂.	2	*Pelecanus erythrorhynchus.*
M crassiceps Piaget	3 ♀♀, 2 ♂♂.	2	*Pulsatrix torquata.*
M. crassipes Piaget	3 ♀♀, 3 ♂♂.	3	*Epimachus magnificus.*
M. crassipes var. *ovata* Piaget	2 ♀♀, 2 ♂♂.	2	*Paradisea rubra.*

* The measurements of a female are given with the original description, but there is no female in the collection.

Species.	No. of specimens in B.M.	No. of slides.	Hosts.
M. crassipes var. *pallida* Piaget	1 ♀, 1 ♂.	1	*Epimachus albus.*
M. crocatum Nitzsch in Giebel	1 ♀, 1 ♂.	2	*Numenius arquatus.* *Hæmatopus ostralegus.*
M. delicatulum Piaget	1 ♀.	1	*Picnonotus ochrocephalus.*
M. dubium Piaget	4 ♀♀.	2	*Edolius longus* (Java).
M. elongatum Piaget	2 ♀♀, 1 ♂.	1	*Pulsatrix torquata.*
M. eurum Piaget	1 ♀.	1	*Carbo javanicus.*
M. eurysternum Nitzsch in Burmeister.	2 ♀♀.	2	*Pica leucoptera.* *Corvus pica.*
M. exile Nitzsch	1 ? ♀ (? imm.)	1	*Sylvia phraginitis.*
M. extraneum Piaget	2 ♀♀, 2 ♂♂.	2	*Cavia cobaya.*
M. femorale Piaget	3 ♀♀, 2 ♂♂.	3	*Platalea leucorodia.*
M. femoratum Piaget[*]	1 ♂.	1	*Paradisea papuana.*
M. fertile Nitzsch	1 ♀.	1	*Upupa epops.*
M. flavescens Piaget	1 ♀, 1 ♂.	1	*Sturnus cristatellus* (Java).
M. flavidum Piaget	1 ♀, 1 ♂.	1	*Eurylaimus cuculatus.*
M. forcipatum Nitzsch in Giebel.	4 ♀♀, 1 ♂.	2	*Buceros cassidix.* *Buceros* sp.
M. fulvofasciatum Piaget	2 ♀♀.	1	*Buteo vulgaris.*
M. fulvofasciatum var. *minor* Piaget.	2 ♀♀, 1 ♂.	1	*Accipiter nisus.*
M. fuscofasciatum Piaget	2 ♀♀, 1 ♂.	3	*Sterna hirundo.* *Sterna cantiaca.* *Lestris pomarina.*
M. fuscofasciatum var. *minor*[†] Piaget.	4 ♀♀, 2 ♂♂.	2	*Sterna cantiaca.*
M. germanum Piaget	1 ♀.	1	*Pogon rolleti.*
M. gonophæa Nitzsch in Burmeister.	2 ♀♀.	1	*C. corax.*
M. gracile Piaget	2 ♀♀, 2 ♂♂.	2	*Porphyrio smaragdinus* (Java).
M. grandiceps Piaget	4 ♀♀, 3 ♂♂.	3[‡]	"Xulla mangola"[§].
M. griseum Piaget	1 ♀, 1 ♂.	1	*Paradisea papuana.*
M. icterum Nitzsch in Burmeister	1 ♀.	1	*Scolopax rusticola.*
M. impar Piaget	4 ♀♀, 3 ♂♂.	3	*Psittacus timneh.* *Psittacus erithacus*[‖].
M. infumatum Piaget	1 ♂[¶].	1	*Dacelo gigantea.*
M. insulsum Piaget	1 ♀.	1	*Psitta* sp.?
M. integrum Piaget	2 ♀♀[**].	2	*Chalibæa viridis.*
M. intermedium Piaget	1 ♂[††].	1	*Fregata minor* (Jachypetes).

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[*] ? Description not published.

[†] This variety is not mentioned by name in the 'Monograph,' but is written on the slide and mentioned on p. 493 (1880).

[‡] One slide contains a specimen of *Colpocephalum ellipticum* Piaget.

[§] This is not the name of a bird, but an island in the Sula-archipelago. The host therefore remains unknown.

[‖] In the 'Monograph' (1885, p. 95) a var. *scalaris* is mentioned from this host, but there is no such indication on the label.

[¶] The measurements of a female are given with the original description, but there is no female in the collection.

[**] The measurements of a male are given with the original description, but there is no male in the collection.

[††] The measurements of a female are given with the original description, but there is no female in the collection.

Species.	No. of specimens in B.M.	No. of slides.	Hosts.
M. interpolatum Piaget	1 ♀, 1 ♂.	1	? Host.
M. latifasciatum Piaget	3 ♀♀, 2 ♂♂.	2	*Tetrao urogallus.*
M. lativulvatum Piaget	1 ♀, 1 ♂.	2	*Megapodium rubripes* var. *forsteni.* *Megapodium freycineti.*
M. latum Piaget	2 ♀♀, 2 ♂♂.	2*	"Pigeon domestique."
M. longipalpe Piaget	4 ♀♀, 2 ♂♂.	3	*Gallophasis melanotus.* *Euplocamus melanotus.*
M. longipes Giebel	1 ♀, 1 ♂.	2	*Brachyotus europæ.* *Strix brachyotus.*
M. longipes var. *minor* Piaget	5 ♀♀.	2	*Strix noctua.*
M. longitarsus Piaget	3 ♀♀, 3 ♂♂, 3 imm.	4	"Kangourou" "Kangourou" (*Halmaturus giganteus*).
M. longithoracicum Piaget	3 ♀♀, 3 ♂♂.	3	*Procellaria cinerea.*
M. lutescens Nitzsch in Burmeister.	4 ♀♀, 1 ♂.	3	*Vanellus pugnax.* *Machetes pugnax.*
M. lutescens var.† Piaget	2 ♀♀.	1	*Alca torda.*
M. mammillatum Piaget	4 ♀♀.	2	*Theristicus caudatis.*
M. meniscus Piaget	2 ♀♀, 1 ♂.	1	*Emberiza lapponica.*
M. merum Piaget	1 ♀.	1	*Ptilopus fasciatus.*
M. mesoleucum Nitzsch in Burmeister.	8 ♀♀, 6 ♂♂, 8 imm.	9	*Corvus cornix.* *Corvus crassicostris.* *Corvus scapulatus.* *Corvus corax.*
M. meyeri Giebel	1 ♂.	1	*Limosa melanura.*
M. minusculum Piaget	1 ♂, 1 ? ♂.	2	*Philopitta jala* (Madagascar). *Rhipidum* sp. ?
M. obovatum Piaget	2 ♂♂, 2 ♀♀.	2	*Corvus scapulatus.*
M. obovatum var. *intermedia* Piaget.	2 ♀♀, 1 ♂.	1	*Corvus torquatus.*
M. obscurum Piaget	1 ♀, 2 ♂♂.	2	*Anas radjah.* *Brenta jubata.*
M. ovatum Piaget	1 ♀‡.	1	*Corvus scapulatus.*
M. pallescens Nitzsch in Giebel	3 ♀♀, 1 ♂.	2	*Perdix cinerea.*
M. pallescens var. *major* Piaget	1 ♀, 1 ♂.	1	*Perdix rubra.*
M. pallidum Nitzsch in Burmeister.	16 ♀♀, 9 ♂♂, 5 imm.	10	*Crossoptilon auritum.* *Pavo spicifer.* *Gallus furcatus.* *Gallus domesticus.*
M. pallipes Piaget	1 ♀.	1	*Excalfactorius australis.*
M. parumpilosum Piaget	1 ♂.	1	*Trichoglossus ornatus* (Celebes).
M. parviceps Piaget	2 ♀♀ §.	1	*Alauda arvensis.*
M. parvulum Piaget	1 ♂ ‖.	1	*Cypselus apus.*

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* One slide has *M. latum* and *M. giganteum* written on the label.

† Not mentioned in 'Monograph.'

‡ A male is mentioned in the original description, but there is no male in the collection.

§ Some immature specimens are mentioned in the original description, but there are none in the collection.

‖ A female is mentioned in the original description, but there is no female in the collection.